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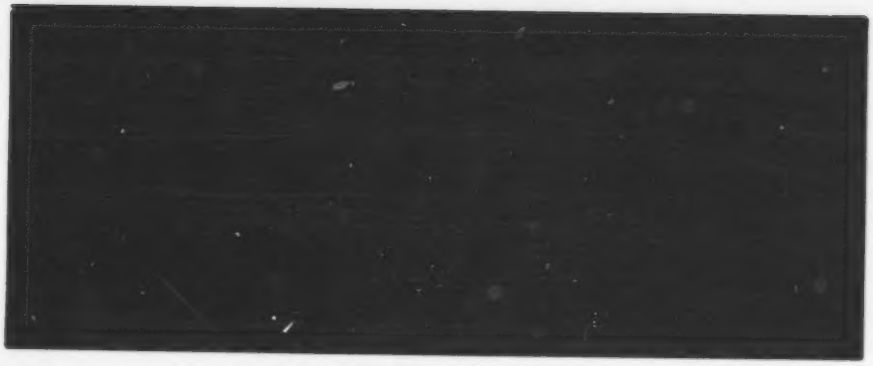

ROUND BALE SILAGE DEMONSTRATION

D-89-05-0525

FINAL REPORT

91-01745/

Saskatchewan Agriculture

Agriculture Development Fund

Project Information

AGRICULTURE DEVELOPMENT FUND
MAR 08 1990
REGINA, SASK.
PROVINCE of SASKATCHEWAN

Cooperator:

Parkland Forage Cooperative
Box 2080
Kamsack, SK.
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Completion Date:

February 11, 1990

Project Name:

Round Bale Silage Demonstration

No: D-89-05-0525

Extension Agrologist:

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ABSTRACT

Under the guidance of the Parkland Forage Cooperative, eight forage producers made 56 bags of round bale silage to evaluate the practice of making and feeding round bale silage. A Tube-O-Lator air tight bale bagger and bale transport were used to place 29 high moisture round bales in a plastic bag 150 feet long. The process for making round bale silage was documented and the feeding of the round bale silage was monitored. The project participants demonstrated that the practice of making round bale silage can be readily adopted on Saskatchewan farms to produce superior quality livestock feed from a variety of forage crops.

OBJECTIVE

To demonstrate and evaluate the practice of making and feeding round bale silage on ten farms in the area served by the Parkland Forage Cooperative. To calculate the economic benefits of making round bale silage which include reduced harvesting losses, improved forage quality, reduced storage losses and better time management.

To determine whether the practice of making round bale silage can be readily adopted by producers.

PROCEDURE

A Tube-O-Later air tight bale bagger and a Tube-O-Later round bale caddy were utilized to make round bale silage. The bagger utilizes 5 mil plastic bags that are 150 feet long in a range of diameters from 4 feet to 5 1/2 feet. The bale caddy is specifically designed to load, transport and unload high moisture round bales. The bale caddy can be adjusted to haul any diameter of round bales positioned end to end for a total length of 20 feet.

Each cooperator produced one or more bags of round bale silage. Four cooperators used alfalfa, two cooperators used cereals, one used sweetclover and one used reed canarygrass to produce the round bale silage. The reed canarygrass round bale silage was ammoniated shortly after bagging to improve the protein content. Information on the procedure for making round bale silage was gathered from the cooperators. Feed tests were done in November to determine the quality of feed produced. During January 1990 each cooperator was surveyed to obtain further information on the feeding of round bale silage.

RESULTS

The following results were obtained from feed tests of the whole plant round bale silage done in November 1989 prior to feeding:

Cooperator	% Moisture	% Protein	TDN
A. Matvenko	70.0	5.69	18-20
Alfalfa	0	19.18	61-63
K. Effa	61.57	4.58	23-25
Barley	0	11.91	63-66
B. Berrns	69.50	2.95	15-17
Barley-Oats	0	9.69	50-52
M. Doogan	63.30	6.73	21-23
Alfalfa	0	18.33	58-60
G. Moriarty	57.19	6.43	22-24
Ammoniated Slough Hay	0	15.02	52-54
C. Vanin	71.69	5.52	16-18
Alfalfa	0	19.51	59-61
B. Chomyn	54.37	7.11	26-28
Alfalfa	0	15.59	58-60
D. Chernoff	53.04	7.48	25-27
Sweet Clover	0	15.92	54-57

DISCUSSION

Forage to be used for making round bale silage should be cut in the full bud or early bloom stage to insure top forage yield and quality, and the proper moisture content for making round bale silage. Moisture content of the forage to be baled should be 50 to 65 percent, although forage at 40 percent moisture has produced excellent round bale silage. Forage at 70 percent moisture or greater has not produced excellent quality round bale silage. Wilting of the cut forage for 1 to 2 days after cutting may be done to reduce the moisture content for the forage.

The John Deere 530, Vermeer G and New Holland 855 balers were used for making the high moisture round bales. Other round balers that have an open throat and produce a hard core bale can also be used.

Travel speed during baling is reduced as windrows of high moisture forage are more difficult to pick up. Adjustments must be made to the baler to insure a compact, high density bale to eliminate air from the bale and maximize the amount of alfalfa in each bale. The diameter of the bale must be monitored closely to insure that the bales are not too small or too large for the diameter of bag being used. The bale should be 1 to 3 inches less in diameter than the diameter of the plastic bag used. If a bale is made too large it will not pass through the bagging machine during the bagging process. The diameter of the bale is to be measured across the width of the bale once the bale is on the ground as bales tend to lose their round shape once they are on the ground.

Hauling and bagging of the bales must be done within 2 to 6 hours of baling to avoid spoilage due to heating. During hot weather a shorter time is desirable. As in other methods of making silage, hauling can be the slowest process for making bale silage. The weight of the bale produced must be taken into consideration when selecting loading and hauling equipment. Round bale silage made in bales 4 feet in diameter weigh approximately 1200 pounds per bale, bales 4 1/2 feet in diameter weigh approximately 1600 pounds, while 5 feet diameter bales weigh approximately 2000 pounds. A self-loading bale caddy specifically built for high moisture round bales was used to haul 5 bales at a time from field to the storage yard. A front end loader and trailer could also be used but will increase the time and manpower requirements. The distance from the field to the storage yard also is a factor to be considered. Hauling distances beyond 2 miles are not practical unless a truck is used to haul the bales. Utilizing the bale caddy towed by a tractor, hauling distances up to 2 miles were practical.

Discussion (continued)

The size of the storage yard must be large enough to accommodate the bags of round bale silage oriented in a north-south direction. Each bag is 150 feet long and space must be provided for the bagging machine to begin and exit from the bagging process. In total a distance of 225 to 250 feet is suggested. The bags of round bale silage must be oriented in a north-south direction to avoid over heating of the silage in the bags. If the bags are placed in an east-west direction, energy from the sun will heat the south side of the bag causing moisture to evaporate from the south side of the bales in the bag. The moisture condenses on the north side of bag and on the north side of the bale. The end result is that the bales will be dry on the south side and saturated on the north side. Excessive moisture accumulation at the bottom of the bag will also result as the water moves down the north side of the bag. All these problems can be avoided by placing the bags in a north-south direction so that heating from the sun occurs evenly through the bag of round bale silage.

Once the desired number of bales for one bag of round bale silage have been positioned end to end in the storage yard the bagging process takes place. Bagging can be done by one man and can be accomplished in 15 to 20 minutes with a 60 hp tractor. The reported time from baling to completion of bagging was 2 hours for a 1 mile haul utilizing a tractor and the bale caddy to transport the bales.

Utilizing a 4 foot wide baler such as the 430 John Deere provided some advantages. The four foot wide baler produces a denser bale than the 5 or 5 1/2 foot wide balers. A 150 foot long plastic bag will accommodate 29 bales 5 feet long with a diameter of 5 feet. The bales weighed 2,140 pounds each for a total weight of 62,060 pounds. A 150 foot long plastic bag will accommodate 37 four foot long bales with 5 foot diameters. Each of the bales four feet long weigh 1,960 pounds for a total of 72,520 pounds of silage. This represents a 16% savings in the bag cost alone. The handling characteristics of a bale 4 feet long are better when being moved by a front end loader.

The plastic bags for the bagging machine are available in diameters of 4, 4 1/2, 5 and 5 1/2 feet. The smaller diameter bales weigh less and are easier to handle. The 4 1/2 feet diameter is recommended. Minor modifications are required to change the bagging machine to a different diameter bag. The bagging machine is durable with no moving parts and is available on a rental basis or can be purchased at a reasonable price.

Discussion (continued)

The ends of the bag must be tied securely to prevent air from entering the tube. Baler twine can be utilized using the miller knot, however, better results can be achieved using a 1 inch wide strip of inner tube approximately 18 inches long to tie the ends. The rubber strip of inner tube should be stretched as it is wrapped around the plastic.

The plastic bags should be checked for tears or punctures after the bagging process is completed and on a regular basis thereafter. Tears and punctures should be repaired utilizing tape available from the bag supplier. If tears or punctures are not repaired, spoilage will occur in the area of the tear. Small tears or punctures will not result in spoilage of all the bales in the bag.

Freezing of the round bale silage was not a problem. The bales in the bag did not freeze. Once the bales are removed from the bag some surface freezing could be seen after a two day period, however under normal conditions the bales were consumed within two days and freezing did not occur. To remove the bales from the bag the bag is cut along the top to expose the desired number of bales. After the bales are removed the bag is folded to cover the exposed end of the remaining bales and a bale of straw or hay is put in place to hold the plastic secure. An alternate method during warm weather is to cut off the loose portion of the plastic bag and to retie the bag end. Spoilage of the round bale silage in the bag is unlikely to occur during cold winter months.

Livestock consumed the round bale silage very readily with less wastage of feed. Producers felt that their animals growth performance was better as feed consumption increased. No health problems were reported from feeding round bale silage.

CONCLUSION

The cooperators for the project reported the following advantages for making round bale silage:

1) Ability to harvest forage in a timely manner without quality losses due to rainfall during the harvest process.
2) Reduced harvesting losses due to leaf loss associated with baling of dry forage, especially on low yielding forage crops.
3) Reduced storage losses due to spoilage from rain on round bales stored outdoors.
4) Improved forage palatability and utilization by livestock due to better forage quality.
5) No additional expensive forage harvesting equipment was required for the process.

The following disadvantages were reported:

1) Hauling was the slowest process in making round bale silage. Improvements could be made.
2) The weight of the bales produced was a problem for some producers. Smaller diameter bales should be considered to reduce the weight of the bale produced.
3) Round bale silage could be more difficult to sell compared to hay.

All project participants indicated that they would consider making round bale silage again. Once the procedure for making round bale silage is learnt, it can become a routine operation on the farm. The practice of making round bale silage can be adopted on most farms. The cost for making round bale silage in bales measuring 5 feet by 5 feet weighing 2,000 pounds was $5.75 per bale utilizing the bagger and bale caddy. Relative to other methods of making silage round bale silage is very economical.

IMPACT

The project was successful in introducing the practice of making round bale silage to the area served by the Parkland Forage Cooperative. The project demonstrated that the practice of making round bale silage can be readily adopted on many farms in Saskatchewan. The procedure for making round bale silage can be easily learnt and developed into a routine for harvesting forage. The cost of the equipment for bagging round bale silage can be recovered in the savings from increased forage quality and quantity produced as compared to dry forage production.

FINANCIAL REPORT

Project Name: Saskatchewan Agriculture Development Fund
Round Bale Silage Demonstration

Project Number: D-89-05-0525

Cooperator: Parkland Forage Association
Box 2080
Kamsack, SK.
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	Budget	Actual
Technician Labor	$ 900.00	$ 845.00
Technician Travel	818.28	522.25
Technician Meals	32.00	32.00
Moisture Meter Rental	100.00	100.00
Equipment Rental	2,500.00	2,500.00
Plastic Bags	1,200.00	1,200.00
Feed Tests	500.00	
Signage and Posts	50.00	
Extension Activities	150.00	50.00
	$6,250.28	$5,249.25